

REMARKS

Claims 1-28 remain pending in the present application. Applicants greatly appreciate the thorough examination of the present application, the allowability of claims 17-21 and 23, and the indication of allowable subject matter in dependent claims 3, 12-14, 27 and 28. Clarifying amendments have been made to the present specification and drawings to address the objections raised in this Office Action. Accordingly, reconsideration and allowance for all of the claims in the present application are earnestly solicited in view of the following amendments and remarks.

The specification has been carefully reviewed for any minor errors as requested.

The drawings have been objected by alleging that every feature of the claimed invention is not shown in the figures. Specifically, it is alleged that the deceleration electrode being segmented is not shown in any of the figures. FIG. 7 and the paragraph bridging pages 9 and 10 of the present specification have been amended to clarify that FIG. 7 and the corresponding portions of the specification illustrate and describe that the acceleration electrode and/or the deceleration electrode may be segmented. As a result, the deceleration electrode is now more clearly shown in the figures. Accordingly, it is respectfully requested that the objection to the drawings be reconsidered and withdrawn.

Claims 1, 6, and 8-10 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,365,070 to Anderson, claims 2 and 11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Anderson and further in view of the prior art in Figs. 1A and 1B of the present application, claims 4 and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Anderson and further in view of Japanese Publication No. 1-209645 to Hashimoto and claims 7 and 15 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Anderson and further in view of U.S. Patent No. 6,326,631 to Politiek. These rejections are respectfully traversed.

Claims 1 and 10 of the present application respectively recite apparatus and methods for producing a low energy ion beam. Specifically, the apparatus and method may be used for ion beam processing of a workpiece in an ion implanting system. An ion beam is accelerated by an acceleration electrode, decelerated by a deceleration electrode downstream of the acceleration electrode, and then the ion beam is inhibited from reaching the deceleration electrode by an ion

optical element downstream of the deceleration electrode. The deceleration electrode has a voltage which provides a potential barrier to thermal ions in the beam plasma for inhibiting thermal ions from reaching the acceleration electrode. A virtual ion image is produced that is larger than ones formed in conventional systems so that the divergence of the final low energy beam is reduced. The current to the acceleration electrode from the beam plasma is also greatly reduced and arcing of the ion optical system is minimized.

Anderson is relied upon to disclose a negative ion beam injection apparatus which includes a focusing electrode 17, a third electrode 18, and a ring lens electrode 19 as illustrated in Fig. 5. The focusing electrode 17 functions as both a focusing electrode with respect to a first electrode 12 and as an electron dump for the extracted electrons. The third electrode 18 reduces the beam energy and the ring lens electrode 19 is held at an electrical potential resulting in a strong deceleration stage. However, Anderson fails to disclose or suggest that a deceleration electrode has a voltage which provides a potential barrier to thermal ions in a beam plasma for inhibiting thermal ions from reaching an acceleration electrode as recited in claims 1 and 10 of the present application.

The prior art in Figs. 1A and 1B of the present application are further relied upon to disclose an acceleration electrode 12 and a deceleration electrode 13. Hashimoto is also relied upon to disclose an ion source as illustrated in Figs. 1-8. Politiek is relied upon to disclose an ion implantation device including a first deceleration stage 4 of a first electrode 8 and a second electrode 10 and a second deceleration stage 6 as illustrated in Fig. 1. However, neither the prior art Figs. 1A and 1B of the present application, Hashimoto, nor Politiek suggest or imply a voltage application which provides a potential barrier to thermal ions in the beam plasma for inhibiting thermal ions from reaching the acceleration electrode as recited in claims 1 and 10 of the present application. Therefore, none of these documents cure the deficiencies of Anderson. As a result, claims 1 and 10 are their respective dependent claims 2, 4-9 and 15 patentably define over the combinations of Anderson with prior art Figs. 1A and 1B of the present application, Hashimoto and Politiek.

Claims 16, 22 and 24-26 stand rejected under 35 U.S.C. §102(b) as being anticipated by Politiek. This rejection is respectfully traversed.

Claims 16, 22 and 24-26 recite apparatus, systems and methods for producing low energy ion beams. Claims 16, 22 and 26 recited that acceleration and/or deceleration electrodes are


segmented. Claims 23 recites that the voltage difference between the acceleration electrode and the deceleration electrode are 5 KeV or more. Claims 24 and 25 recite that the potential on the deceleration and/or deceleration electrodes are varied transversely with respect to the beam line. Segmenting the electrodes and varying the voltages can tailor the focus of the ion beam by adjustments and variations in the segmentation and voltages. In contrast, the ion implantation device of Politiek as described in the rejection above fails to suggest or imply segmenting the electrodes and varying the voltages to tailor the focus of the ion beam by adjustments thereof as recited in these claims of the present application. Accordingly, it is respectfully submitted that claims 16, 22 and 24-26 patentably define over Politiek.

In view of these amendments and for all of the above stated reasons, it is respectfully submitted that all of the outstanding rejections have been overcome. Therefore, it is requested that claims 1, 2, 4-11 and 15-26 along with allowed claims 3, 12-14, 27 and 28 of the present application be passed to issue.

If any issues remain unresolved, the Examiner is requested to telephone the undersigned attorney.

Please charge any additional fees or credit any overpayments to deposit account No. 50-0896.

Respectfully submitted,
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Enclosure: Replacement Sheet for Fig. 7
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